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09/701,587	11/30/2000	Hans Peter Rath	49091	5855

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/701,587
Filing Date: November 30, 2000
Appellant(s): RATH, HANS PETER

Michael P. Byrne
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed July 16, 2007 appealing from the Office action mailed December 14, 2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

5,408,018	Rath	4-1995

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 12-, 14-17, and 21-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rath (US 5,408,018).

The instant claims are directed to a polyisobutene and a cationic polymerization process for preparation of such a polyisobutene having a terminal vinylidene group content of more than 80 mol% and average molecular weight of 500-5000 in the presence of a complex comprising boron trifluoride, a primary or secondary alcohol, and a secondary ether containing no tertiary alkyl groups, wherein the molar ratio of alcohol to ether is 0.01:1 to 1:1, and the molar ratio of the sum of alcohol and ether to boron trifluoride is from 1.4 to 2.

Rath teaches a process for preparing polyisobutene with a content of terminal vinylidene groups of more than 80 mol % and average molecular weight of 500-5000 in the presence of a complex comprising boron trifluoride, secondary alcohol, and dialkyl ether (col.4, lines 44-57). Rath further teaches that the dialkyl ethers can be symmetrical and unsymmetrical C_2-C_{20} dialkyl ethers (col. 7, lines 61-65). One of ordinary skilled in the art would immediately envision the simplest symmetrical C_2-C_{20} dialkyl ethers to be diethyl ether, dipropyl ether, diisopropyl ether, dibutyl ether, di(2-butyl) ether, etc.. The dialkyl ethers with alkyls such as isopropyl and 2-butyl are secondary ethers which meet the limitation of the instant claims.

Rath's Examples 6, 7 and 8 teach polymerization processes for preparation of a polyisobutene having a terminal vinylidene group content of more than 80 mol% in the

presence of a complex comprising boron trifluoride, 2-butanol, and an ether of 2-butyl tert-butyl ether or di-n-butyl ether, wherein the wherein the molar ratio of alcohol to ether and the molar ratio of the sum of alcohol and ether to boron trifluoride are in the ranges of the instant claims. The isobutene polymer of Example 6 has an average number molecular weight of 1065 and terminal double bonds of 92% which meets the limitations of claim 27.

It is noted that Rath teaches that the tertiary alkyl group containing ether is preferred, however, Rath's dialkyl ethers are not limited to the tertiary alkyl group containing ether. As shown above, four of Rath's simplest symmetrical dialkyl ether are diethyl ether, dipropyl ether, diisopropyl ether, dibutyl ether, di(2-butyl) ether, and Rath's Example 8 shows inferior isobutene conversion and lower percentage of terminal double bond in the polyisobutene when di(n-butyl) ether is used.

Therefore, it would have been obvious to a skilled artisan at the time the invention was made to employ Rath's teaching to prepare polyisobutenes in the presence of a trifluoride/secondary alcohol/dialkyl ether complex wherein the dialkyl ether is the simplest symmetrical secondary dialkyl ether such as diisopropyl ether and di(2-butyl) ether in order to lower the cost and in search for a catalyst composition to provide increased isobutene conversion and percentage of terminal double bond in the polyisobutene since such within the scope of Rath's teaching and all of the embodiments of the reference are expected to work and in the absence of any showing of criticality and unexpected results.

Furthermore, Rath also expressly teach that "dialkyl ether coligands are C_2-C_{20} dialkyl ethers", "[t]he mixed boron trifluoride/secondary alcohol/dialkyl ether complex catalysts can contain the secondary alcohol and dialkyl ether ligands in virtually any ratio of amounts", and "the optimal secondary alcohol/dialkyl ether ratio also depends on the nature of secondary alcohols and the dialkyl ethers used in each case" (col. 7, lines 61-62; and col. 8, lines 21-24 and 27-29). Apparently, Rath does not particularly limit the type of dialkyl ether when the mixture of a secondary alcohol and dialkyl ether is used in the catalyst system, i.e., Rath's dialkyl ethers include those ethers of the instant claims, and Rath's ratios of (secondary alcohol)/(dialkyl ether) and (secondary alcohol+dialkyl ether)/boron trifluoride include those ratios of the instant claims. When both secondary alcohol and dialkylether such as bis(secondary alkyl)ether are used in preparation of the catalyst, the optimized ratio would be expected to be in the range of the instant claims since the purposes of both Rath's process and the process of the instant claims are identical--for the preparation of the same type of polyisobutene in the presence of catalysts having the same components.

(10) Response to Argument

First of all, appellant argues that, in US 5,408,018, Rath does not teach or suggest the same catalyst complex of the instant claims since Rath teaches that poorer results are achieved when the ether utilized in the catalyst composition does not contain at least one tertiary alkyl groups. This is incorrect. As shown in the rejection above, Rath teaches the alkyl group in the dialkyl ether of the catalyst composition can be

secondary or tertiary. It is noted that Rath does expressly teach that the dialkyl ether having at least one tertiary alkyl is preferred and Rath's Example 8 shows inferior isobutene conversion and lower percentage of terminal double bond in the polyisobutene when di(n-butyl) ether is used compared to Examples 6 and 7 where 2-butyl tertbutyl ether is used, Rath does not teach the dialkyl ether containing at least one secondary alkyl but no tertiary alkyl providing inferior results. On the contrary, as shown in the above rejection, using a secondary alkyl ether is within the scope of Rath's disclosure and a skill artisan would have been motivated to used the simple symmetrical ether such as diisopropyl ether and di(2-butyl) ether for at least economical reasons and increasing isobutene conversion and percentage of terminal double bond.

Secondly, Appellant's Declaration under 37 CFR 1.132 filed on January 16, 2003 does not provide any unexpected result. First of all, Appellant has not compared the alleged inventive example with Rath's preferred working example, Example 6. Rath's Example 6 has a terminal double bond content of 92 mol% which is comparable to the 95.9% of Appellant's preferred example, i.e. the percentage of the terminal double bond of appellant's Example is not unexpected better than that of Rath's Example 6. Appellant also failed to provide data such as the percentage of isobutene conversion, thus a full-scale comparison is not possible. Secondly, the alleged "Comparative Example according to US 5,408,018" in the declaration is neither Rath's preferred example nor back to back comparison to appellant's Example because the ratios among boron trifluoride, alcohol and dialkyl ether used in Appellant's Example and "Comparative Example according to US 5,408,018" are not the same. Thirdly, the

showing is not commensurate with the scope of appealed claims since Appellant only provides one Example which is not representative of the full scope of the claims.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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Primary Examiner

Conferees:

David Wu
Supervisory Examiner

Romulo Delmendo - Appeals Specialist